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ABSTRACT

This paper discusses a study undertaken to analyze pre-and posttest scores of junior high and high school students involved in an aging education unit. Objectives were to determine whether a unit on aging helped students relate to aging as part of the life cycle and to assess the success of different modes of instruction (i.e. independent study, teacher-oriented study, and a senior citizen role model approach) on student performance. The sample consisted of approximately 300 students in nine health classes in grades nine through 12 at a high school/career development center in Dallas, Texas. Emphasis was placed on whether the program was effective in teaching students about aging; whether students felt that the mode of instruction influenced the effectiveness of the curriculum; whether race, sex, and/or previous health study influenced test scores; and whether race, sex, and/or previous health study was related to mode of instruction with regard to the effectiveness of the program. Scores of all students on pre- and posttests were statistically analyzed and compared with scores on the same tests for students in a control group who were not provided any information on aging. Findings indicated that while all variables but grade had a significant affective result, only treatment and race had significant effects on cognitive results. Specifically, white students who were taught by teacher-oriented study and/or a senior citizen role model approach scored significantly higher than students who were black and/or taught by an independent study method. The conclusions are that students can learn about and build up more positive attitudes toward older people by participating in an aging education program, and that they will learn the most taught by focused and guided study rather than independent study. (DB)

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AGING EDUCATION FOR HIGH SCHOOL STUDENTS: EFFECTIVENESS ACCORDING TO THE MODE OF INSTRUCTION

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Abstract

Pretest and posttest mean scores of health students who had participated in an Aging Education study program were analyzed using a 4 Treatment (Independent Study, Teacher-oriented, Older-role model oriented, and Control Group) X 2 Races (White vs. non-white) X 2 Sexes (Male vs. female) X 3 Grade (9, 10, 11-12) design (Cognitive and affective) posttest scores were analyzed with both pretests as covariates, followed by an item analysis of the Palmore Facts on Aging Quiz, used as the affective measurement tool in this study. All variables except the control group showed a significant gain in the cognitive posttest ($P \leq 0.0005$) and on the affective posttest ($P \leq 0.001$). Only Treatment and Race were significant variables on both posttests. Sex, amount of previous health-study (Quarter), and Grade were significant only on the affective posttest. However, significant 2-way interactions only occurred for treatment by Quarter on both posttests and Treatment by Grade on the affective posttest. In all cases the independent study group showed some significant gains but students in the groups with more focused and guided study (Teacher-oriented and Older role-model) were almost twice as successful. The results of the analyses of the latter two groups indicate they were similar in effectiveness especially on

cognitive tests, Analysis of the Palmore test indicated a high (0.72) internal correlation for the pretest but a lower (0.56) though very significant internal correlation for the posttest when used as a measure of bias. Student scores indicated a lessening of both positive and negative bias (by 8.2% and 7.9%). Student analysis indicated similar biases to adults with both more educational and life experiences, although they scored somewhat lower in the overall number correct. Results of the analysis of Palmore's Quiz suggest it is best suited for comparison between naive groups since cognitive factors appear to "contaminate" the results where a change in bias is measured.

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In the last decade, the long sought increased life span has become a fact for an increasing number of Americans. This goal of society and modern medicine has proven to be both a joy and a curse. There exists a very real phsychological, physical, social and economic crisis with advanced age and the onset of increased limitations. Each individual, if aware of these limitations, alternatives for them, and the possibility of the development of latent talents, has not only the challenge but the probability of a uniquely satisfying old age.

These facts are being acknowledged by Senior Citizen organizations, community centers, hospitals and churches. In addition, the popular literature on these topics continues to grow with such books as Ageless Aging (Winter, 1973), When Your Parents Grow Old (Otten & Shelly, 1976), Passages (Sheeny, 1977), and The Seasons of a Man's Life (Levinson, Darrow, Klein, Levinson, & Mckee, 1978) aimed at the younger adult. While these are helpful in enlightening the adult of the changes in relationships, physique and abilities as one grows old, and in providing resources materials, many young adults have already developed life styles will hinder their attainment of a "good age". As a consequence, programs such as R.S.V.P., the Retired Senior Volunteer Program, and numerous Foster Grand-parent programs have evolved to help the

old and the very young alike in understanding and forming relationships with one another.

But, what happens to the children as they grow up in an increasingly youth oriented culture? More and more of them will live to be 60, 70, 80, and perhaps beyond. One out of five persons living will be over 65 by the year 2000 (Myers, 1974).

In today's highly mobile society many children have not had a physically close multigenerational family experience. As a consequence, large numbers of today's high school students received much of their information about aging from the proliferation of children's stories published in the last 15 years. But these, while sensitive to the needs of children for such information, have been a major source of agism. Grandma and Grandpa have not been as frequently portrayed as the stereotyped older couple of the Dick and Jane era, who ran the family farm, but many of these books have stereo-typed the grandparents and others over 65 as bent-over, white-haired, dependent, wrinkled, "magical" individuals who have no discernable function or position, who "say" rather than "do" or who are absent from everyday life (Ansello, 1978; Storey, 1977; Wexier, 1977). Storck and Cutler (1977) also found unrealistic and negative characterization of the elderly in their review of

award-winning picture books from 1940 to 1975. In addition, Storey (1977) noted that in picture books "...grandparents appeared to be too old, considering the age of their grandchildren". In particular, he cited the example of a five year old child with an 85 year old grandfather in a nursing home. In their analysis of books which have won the Newberry Medal for Adolescent Literature, Peterson and Eden (1977) noted that while older people were well represented numerically, they were underveloped and consistently played peripheral roles within the plot. Character strengths such as wisdom, insight, and patience that can be gained through the process of aging were found to be absent, or not recognized, or not rewarded in the stories. There seemed to be little value in being old or in having older people around. Thus, such books have only perpetuated exaggerated disabilities and inadequacies of old age, giving young people negative models of "old folk" and the aging process.

Recently there has been much interest in helping children cope with death, yet very little has been done to help students relate to aging as part of the life cycle. Fortunately, such an interest in aging has begun to develop among psychologists, educators, sociologists, and government officials. Assessment of attitudes towards aging are

indications of this interest. In addition, Drake (1954) indicated that many factors influence attitudes towards the elderly, and that the idea that more intimate contacts with the elderly leads to a breakdown of unfavorable attitudes does not always apply. Jantz, Seefeldt, Galper, and Serlock (1977) noted that school children understood the concept of old, and have attitudes towards aging that are a mixture of positive and negative. When confronted with aspects of their own aging, however, their attitudes tended not to be positive. In addition, children's attitudes towards the elderly are either stereotypic or negative regarding the physical aspects of aging (Seefeldt, Jantz, Galper, & Serlock, 1977).

A recent study of Dallas high school students by Storck and Culter (1979) indicated a similar mixture of attitudes. For example, although there was an age trend away from stereotypical attitudes, an age bias against the elderly comparable to that found in studies of adult and elderly subjects was determined, suggesting that by late adolescence negative attitudes towards aging and the aged have been established. In contrast, Ivester and King (1979) indicated that the majority of adolescents in their study had generally positive attitudes towards the elderly. However, the Harris survey of those 18 years of age and

older concluded, "...the older public like the young, have bought the negative images of old age. They apparently assume that life is really tough for those of 65, and they are merely exceptions to the rule." (National Council on Aging, 1975, p. 38). Thus, while there exists some encouraging research, negative attitudes and stereotyping are serious problems.

Bennett and Eckman (1973) pointed out that the negative views of aging are dangerous since they may result in an old person's unwillingness or inability to seek needed services, health care and other needs. They may also affect others in the same environs as the elderly, who may as a result, feel free to ignore or respond negatively to the elderly. Probably more important, they reinforce negative attitudes towards aging in the young, thereby establishing a cyclic pattern of negative and depressive attitudes towards aging. Consequently, Bennet and Eckman (1973) stated it is necessary to change the attitudes of both old and young regarding the aging process. Furthermore, the need for children to view their own aging positively, and to view the elderly as a group of individually diverse people is of utmost importance, according to Seefeldt et al (1977), so that they will be able to "...achieve their full potential. Only as children are able to adapt to their own changing, growing, aging bodies

will they develop the positive self concepts, necessary for full living at every stage of life."

The Harris Survey likewise recognized the dangers of negative views of aging to the young.

> Portraits of the elderly as economically and socially deprived and in desperate need of help from all sides might tempt the young to turn their heads away from the elderly, these reminders of what life will be like for them too some day, and to focus their attention instead of a youth-oriented society. In turning away from the old they would deprive themselves of the contributions that older Americans can make to themselves and to society as a whole. They would ignore a large and useful resource.
>
> Negative portrayals of old age can do the young another disservice as well. Exaggerations of the problems of old age might instill in the young a deepseated fear of growing old. They might force the young to struggle to look and act young, thus inhibiting maturity and preventing the young rrom enjoying the natural and rewarding process of aging. They may cause fears of aging that inhibit normal rational planning for their later years.
> (National Council on Aging, 1975, pp. 38-39)

This same study also indicates that the lack of such rational planning was one of the most significant regrets of the elderly. Consequently, "If we expect negatives losses, and inabilities with aging, growing older will be dreaded. And it is." (Ansello, 1978).

Therefore, a problem of attitudes and their effects does exist. John (1977) indicated that children should be taught about aging within the family. Therein, children should be permitted to form warm sensitive relationships

spanning generations and learn realistic positive variations as part of the life span.

The family unit is only one source of learning experience for the young. What about other sources of information and learning programs? Can the young be taught more positive attitudes? Bennett (1976) noted that many programs to do this have been aimed at students and professionals in the health fields, and psychology and social science students. The results were mixed, but indicated that a possibility exists to effectively change attitudes towards aging. She was convinced that people should be made to "...stop perpetuating the view of the aged as 'them' and the young as 'us'. The aged are all of us. People cannot be detached from their own future without paying a great price..." But, as she noted earlier (Bennett and Eckman, 1973), "We need to determine experimentally the best ways of modifying these attitudes."

Thus, it is important to determine what programs have been developed and what methods and programs have been tested for effectiveness. Many publishing companies are rushing for money, and selling pamphlets and curricula of questionable quality. Blue-Cross Blue-Shield, other insurance companies and banks (S.O.S.) have provided pamphlets, speakers, and resources to help individuals plan

for a healthy future. The Ohio State Commission on Aging has developed a series of curricula (Hayslip & Sterns, 1975; Myers, 1974; Randall, 1975; Rivera, 1975; Stuecher & Myers, 1975.). Yet, despite the good intentions of the Ohio State Commission on Aging, Russull (1979) noted that few schools were utilizing these resources. Most schools using these materials were elementary schools. Furthermore, the success of the programs was subjectively determined, and teachers often felt inadequate in their knowledge. As a result, two important needs were emphasized:

1. Educators need to be made aware of the need to train themselves and their students in the process of healthful aging.
2. Objective assessment of the various aging education and attitude changing programs is needed.

Tibbetts (1979) theorized that changes in American society and the attitudes of the elderly may help to invalidate negative stereotypes of aging. But if these are to be encouraged, the young must be encouraged to participate in the change. Two significant studies have been done to determine if programs can be developed which are effective in doing that, developing positive realistic attitudes towards aging.

Labouvie-Vief and Baltes (1976) have determined that

adolescent misperceptions of the aged could be reduced with training using older individuals as models in a limited training experience. The results showed small but significant degrees of effectiveness. However, they used a model-student ratio of 1:4, which is impractical in a high school setting.

More significant is the study by Trent, Glass, and Crockett (1979) using 4-H Club members, since it involved large groups of adolescents. Three types of experiences were proved.

1. A series of six 1½ hour seminars dealing with the problems and satisfactions of aging.
2. In-depth interviews with older adults over a period of 6 weeks.
3. A combination of 1 and 2.

All groups exhibited a significant change in attitude change occured among the experimental groups.

While the 4-H Club setting is valuable, many young people, especially those in urban areas have no such contact. Thus, as Russell (1979) noted, the public schools have an opportunity to provide such training to a large number of students. Also, Bass (1979) noted that individuals vary greatly in cognitive style in regard to classroom learning, and Glover (1978) noted the great importance

and effectiveness of a teacher model. While the 4-H Club study considered these, both variations are even more pronounced in urban high schools. Thus, teaching method and modeling effectiveness are important condiderations in determining the most effective method of instruction to equip high school students with the skills and attitudes which are of benefit in attaining successful maturation, health and vigor through out their adult lives.

This study, analyzing pretest and post-test scores of students involved in an aging education unit, was primarily done to determine any increase in the adolescents ability to perceive aging and maturation as normal and gradual parts of the life cycle. The other primary goal of this study was to assess the success of the different modes of instruction during an approximately two-week long unit. In order to determine these factors, the following questions were asked:

1. Is this program in Aging Education effective in teaching and informing students of widely varying abilities, in a public school setting, about the abilities, challenges and problems of aging and the aged as measured by pretest and posttest both cognitive and affective tests?

2. Does the mode of instruction (Treatment) have

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TABLE 1

Palmore's Facts on Aging Quiz (Palmore, 1977)

1. The majority of old people (past 65) are senile (i.e. defective memory, disoriented, or demented).
2. All five senses tend to decline in old age.
3. Most old people have no interest in, or capacity for, sexual relations.
4. Lung capacity tends to decline in old age.
5. The majority of old people feel miserable most of the time.
6. Physical strength tends to decline in old age.
7. At least one-tenth of the aged are living in long stay institutions (i.e. nursing homes, mental hospitals, homes for the aged, etc.)
8. Aged drivers have fewer accidents per person than drivers under age 65.
9. Most older workers cannot work as effectively as younger workers.
10. About 80% of the aged are healthy enough to carry out their normal activities.
11. Most old people are set in their ways and are unable to change.
12. Old people usually take longer to learn something new.
13. It is almost impossible for most old people to learn new things.
14. The reaction time of most old people tends to be slower than the reaction time of younger people.
15. In general, most old people are pretty much alike.
16. The majority of old people are seldom bored.
17. The majority of old people are socially isolated and lonely.
18. Older workers have fewer accidents than younger workers.
19. Over 15% of the U. S. population are now age 65 and over.
20. Most medical practitioners tend to give low priority to the aged.
21. The majority of older people have incomes below the poverty lever (as defined by the Federal government.)
22. The majority of older people are working or would like to have some kind of work to do (including housework and volunteer work.)
23. Older persons tend to become more religious as they age.
24. The majority of old people are seldom irritated or angry.
25. The health and socioeconomic status of older people (compared to younger people) in the year 2000 will probably be about the same as now.

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TABLE 2

Description of the Variables

TREATMENT:

1. INDEPENDENT STUDY-Assignments, other requirements, films, and other resources were identical to those of other student groups. Students were required to meet a timetable identical to other students, but worked independently of the teacher except for the explaination of assignments.

2. TEACHER ORIENTED STUDY-In addition to assignments, films and other resources, teachers presented lectures, lead discussions, and provided direction for the class to re-enforce the requirements of the program.

3. SENIOR CITIZEN ROLE MODELS-In addition to assignments, films and other resources, members of the American Association of Retired Persons-National Retired Teachers Association: aged 65-75, 3 white-1 non-white, 3 females-1 male, all actively employed part time, re-enforced and enhanced the requirements of the program, chiefly by discussing their own lives and work as it related to a healthful process of aging. Teachers provided direction for these discussions to maintain consistency of information provided within treatment groups.

4. CONTROL GROUP-Students were not provided any information on aging by their teachers.

RACE:

Includes a variety ethnic backgrounds grouped White and Non-white. Both native Dallasites and individuals who have recently moved to the Dallas area from both major cities and rural communities are included in each group although exact statics on individuals were not available.

White: Chiefly of European ancestry
Non-white: Black, Hispanic, American Indian and Asian

SEX:

Male
Female

QUARTER:

Previous related study-Students were required to study health for two quarters. Those who were in the second quarter had studied such related topics as mental health, and nutrition. About 50% of the quarter 2 students had the same teacher both quarters.

GRADE:

Grade or school year is determined by the number of class credits a student has earned, but implies an approximate age of students:

Grade 9: 14-15 years
Grade 10: 15-16 years
Grade 11-12: 16-18 years

an effect on the effectiveness of the curriculum as demonstrated by pretest and posttest scores on both cognitive and affective tests?

3. Did Race, Sex previous study in health course (Quarter) or high school Grade have a significant effect on the students previous knowledge and prejudices and/or the effectiveness of the program as measured by pretest and posttest scores on both cognitive and affective tests?

4. Did Race, Sex, previous study in the health course (Quarter), or high school Grade have a significant interaction with the mode of instruction in the effectiveness of the program as measured by pretest and posttest scores on both cognitive and affective tests?

5. Is the Palmore Facts on Aging Quiz (Palmore, 1977; Table 1) an accurate and reliable measurement tool as indicated by an analysis of pretest and posttest scores?

In order to determine the specific relationships among the mean test scores as noted above, the five variables described in Table 2 were used: Treatment, Race, Sex, Quarter, and Grade. Since it was hypothesized that Treatment was a significant variable, the means were also deter-

mined for Treatment by Race, Sex, Quarter and Grade subgroups. Since it was also hypothized that cognitive and affective pretest scores might be related to the posttest scores, posttest means for each variable and treatment subgroup were analyzed. Furthermore, the validity of the affective test used, Palmore's Facts on Aging Quiz, has recently been questioned by Klemmack (1978) and Holtzman and Beck (1979), however, there was some reason to question their complaints because of the populations used in their studies and/or their method of analysis. Thus, a detailed analysis was made of both the test itself and the population's responses to the test, to answer the question of validity.

Method

Subject Sample

The pretraining and posttraining mean scores used in this study were of ninth, tenth, and eleventh and twelfth grade students in nine health classes at Skyline High School and Career Development Center in Dallas, Texas. These classes represent a wide range of abilities, since health is required of all students with the exception of only the most severly educationally handicapped. In addition, students were randomly assigned to all of the health classes except for quarter of study, and all classes

TABLE 3

Percentage of Students with 70% Compency
(Criterion for Passing)
on the D.I.S.D. Basic Objectives Assessment Test
High School Division ONLY of Skyline Center

	1	2	3	4	6	7
Grade 10 *(9)	69.7	76.5	82.9	56.1	49.0	53.5
White	81.5	86.2	87.0	69.4	61.0	76.4
Black	50.9	62.1	81.6	31.6	25.0	31.2
Hespanic	53.8	61.5	59.7	46.2	40.0	24.0
Grade 11 *(10)	76.8	83.0	87.8	66.5	55.7	59.8
White	90.6	95.0	96.5	83.7	71.1	74.9
Black	58.7	68.5	79.0	45.5	37.4	39.2
Hespanic	84.2	78.9	84.2	52.6	38.9	44.4
Grade 12 *(11)	79.2	87.1	92.7	72.6	71.7	65.5
White	93.4	98.0	96.7	90.7	87.3	85.3
Black	65.5	78.2	88.7	53.5	56.7	44.3
Hespanic	72.7	77.3	95.5	72.7	59.1	54.5

BOAT Objectives related to skills utilized by students participating in the Aging Education Study

(1) Consumerism
(2) Community
(3) Medical
(4) Home
(6) Government
(7) Information Sources

*Grade at time of Aging Education Study-Grade in brackets is grade at time the BOAT was given (Spring, 1979). Scores were unavailable for current 9th grade class.

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TABLE 4

Iowa Tests of Educational Development
Median Percentiles - Test Results
Skyline Center
High School Division ONLY

Grade	Reading	Social Studies	Science	Sources
Grade 10*(9)				
Race				
All races	45	30	32	36
White	60	44	47	51
Black	29	25	22	26
Hispanic	19	20	14	26
Grade 11*(10)				
Race				
All races	55	42	42	48
White	72	52	64	67
Black	23	22	27	28
Hispanic	53	22	20	33
Grade 12*(11)				
Race				
All races	44	39	37	50
White	68	53	62	71
Black	22	18	19	28
Hispanic	37	43	28	46

(Adapted from Hardie et al, 1979)

*Grade at time of Aging Education Study--grade in brackets is the grade at the time students took the ITED Tests, Fall, 1978. Scores were unavailable for current ninth grade class

were heterogenous. However, within individual classes in this study there was not an equal distribution of cognitive abilities. Students were assigned to the classes six days before the study, since at that time the school district opperated on a quarter system.

The ninth grade students assigned to this school had a median percentile score of 78 for reading on the Texas Assessment of Basic Skills Test. (Rice and Austin, 1980). Since students at Skyline come from all areas of the school district, scores on both the Basic Objectives Assessment Test (BOAT) and the IOWA Test of Educational Development which they took in Spring, 1979 could not be obtained. Scores for upper classmen on both measurements, Tables 3 and 4, indicate scores slightly below average, for the total High School population which includes all of those taking health at Skyline, on those measurements of skills related to the information presented in the course.

Materials

The resources used, Education for Aging: A Teacher's Sourcebook developed by Fran Pratt (1979) for the National Retired Teachers Association and Health, Quackery, and the Consumer (Schaller & Carroll, 1976) were chosen for flexibility, content, and availability. The same films, film-

strips, study questions, and other materials were used by all students. Identical assignments were made to all students; Topics included in the unit were as follows:

1. Psychological theories of aging
    a. Disengagement theory
    b. Activity theory
    c. Continuity theory
2. Personality Stereotypes
    a. Mass media and literature
    b. Cultural stereotypes
    c. Specific misimterpretations i.e. loneliness
3. Intelligence-crystallized v.s. fluid
4. Social aspects of aging
    a. Roles in society and population changes
    b. Youth oriented culture
    c. Intergenerational and family relationships
5. Physical aspects of aging
    a. Toll of alcohol, tobacco and drug use
    b. Nutrition-nutrients and overeating
    c. Physical Fitness and vigor
    d. Common health problems-how to cope with them
    e. Nursing homes, hospices, hospitals, etc.,-patients rights and alternative care
6. Consumerism
    a. Economics of aging
    b. Quackery
    c. Social Security
    d. Medicare, Medicaid, and other health insurance
7. Planning for a vigorous life (conclusion and aspirations

The same objective pretraining and posttraining evaluations were required of all the Aging Education Unit. The pretests and posttests were identical except for the sequence of questions; and in the cases of matching questions used for the sequence of answers too. Objective tests were used for ease of grading. Purthermore, since an earlier study

TABLE 5

Cognitive Test
Aging Education Unit

Part I: True - False

1. All U. S. citizens are automatically able to receive Medical benefits at age 65.

2. Most old people never become senile.

3. All old people with jobs retire by age 70.

4. All jobs allow you to collect Social Security benefits upon retirement.

5. Many cases of arthritis can be controlled if treated early.

6. Jogging daily prevents you from ever having a heart attack.

7. Most medical problems people have as they grow older can be cured.

8. Testimonials are reliable when buying health aids, O.T.C. drugs and health insurance.

9. Catastrophic Illness insurance is automatically included under Medicare.

10. B

10. Bait advertising is used by many stores etc. to confuse the consumer and convince him/her to purchase more expensive products.

Part II: Matching

11.	Ageism or agism	A.	A branch of medicine: deals with old age.
12.	Bias	B.	A prejudiced view; doesn't recognize the individual.
13.	Geriatrics	C.	Discrimination in relation to age.
14.	Gerontology	D.	Prejudice for or against.
15.	Stereotype	E.	The scientific study of aging.

TABLE 5 Continued

16.	Inflation	A.	A function performed by someone, i.e. teacher, mother.
17.	Role	B.	Retired executives etc. who provide assistance in developing nations
18.	Medicaid	C.	Retired individuals who volunteer in community based programs.
19.	SCORE	D.	Available for those who cannot pay for essential medical services-any age group.
20.	R.V.S.P.	E.	A major problem for all age groups, but especially those with a fixed limited income.
21.	Activity theory	A.	Society withdraws from the individual as he/she gives up roles in society.
22.	Continuity theory	B.	Old people try to remain active and useful.
23.	Cohort factors	C.	With advancing age people become more like themselves - often keep the job if self employed.
24.	Retirement	D.	To stop working at a particular job.
25.	Disengagement theory	E.	Attitudes, values, habits, etc.
26.	Morbidity	A.	Exists for long periods of time
27.	Mortality	B.	Cancerous
28.	Chronic	C.	Severe for shorter periods of time.
29.	Acute	D.	Death rate.
30.	Malignant	E.	A departure from a state of well-being, physical or mental.

TABLE 5 Continued

31. Metabolic	A. Existing from birth.
32. Endocrine	B. Physic l or mental stress.
33. Congenital	C. Having to do with hormones.
34. Terminal drop	D. Having to do with the building up and breaking down of body chemicals.
35. Trauma	E. Lowered I.Q. in the months just preceeding death.

NOTE: In this section only, three questions have two or more answers.

36. Calories	A. Necessary to build and repair cells.
37. Vitamins	B. Found in small print on labels of canned foods.
38. Meals on Wheels	C. Not as many needed as one ages.
39. Nutritional	D. A community service to help some disabled older citizens - often operated by volunteers.
40. Protein	E. Work with enzymes to allow chemical reactions to take place in the body.

41. Gerontophobia	A. Amount doctors in a general area will charge for a specific service - data often 1 to 2 years old with Medicare.
42. Assignment	B. The process of preventing "harm".
43. Reasonable charge	C. Fear of growing old.
44. Rehabilitation	D. To restore to healthy or normal or usual acceptable activity.
45. Prophylaxsis	E. Paid to doctors, usually directly, upon agreement. Usually set in advance.

TABLE 5 Continued

46. Quackery	A. Skills acquired through education.
47. Fluid intelligence	B. Worthless "cures" - The elderly are susceptible.
48. United States Postal Service	C. Recommended daily allowance.
49. R.D.A.	D. Regulated the distribution of products and fraud through the mails.
50. Crystallized Intelligence	E. "Culture free" abilities.

(Storck and Cutler, 1979) at the same school indicated that a number of students seemed to have difficulty with completion of questions. It was hoped that these tests which included recognition as well as pure recall questions might be more helpful in testing some students with lower cognitive abilities, who otherwise might be excluded from the data analysis.

The cognitive-test was teacher-designed (Table 5). Palmore's Facts on Aging Quiz (Palmore, 1977; Table 1) was used as a quick, easy to score affective measurement tool. This was developed by Palmore (1977) ". . . to measure the effects of courses or training materials and to measure the changes in information or biases over time.

General Procedure

In order to answer the five questions asked earlier about the overall effectiveness of the program, and the relationships between the variables: Treatment, Race, Sex, Quarter and Grade, described in Table 2, a series of five groups of analyses of the test results was performed after the Aging Education Unit was completed. Previous to this series of analyses, all students involved, except controls, were participants in the Aging Education Unit and had completed two weeks of study including cognitive and affective pretest and posttest measurements. Pretests, and later,

posttests were given on the same day for all students, the 1st and last day of the Unit. Test scores on these tests were analyzed.

Analysis 1

Procedure

Using the test scores of all the students, the mean, standard deviation, and variance were determined for the correct answers on the cognitive and affective pretests and the cognitive and affective posttests. A two-tailed test was applied to the means to determine if significant changes occured during the training period.

Results

Significant positive changes occurred in both cognitive and affective abilities as noted on Table 6, as a result of the Aging Education Unit. Pretest and posttest means are not equal and posttest means are significantly greater.

Discussion

This program in Aging Education was effective in a public school setting. It was successful despite the fact that the student sample included a variety of cognitive abilities, many below average as indicated by test scores on Tables 3 and 4. The affective posttest means of correct answers approach those of Dental assistants, and hospital aids and orderlies and medical technicians, indicating that

TABLE 6

Cognitive and Affective Pretest and Posttest Results for all student Test Scores - (N = 190)

Test Type	Pretest	Posttest
Cognitive:		
Mean	21.46	30.50
Standard Deviation	9.49	9.65
Variance	89.96	93.12

$t = 9.209$

$P\ (|t| \geq 9.209) < 0.0005$

The cognitive posttest mean is not equal to, but significantly greater than the cognitive pretest mean.

Affective:		
Mean	10.50	14.36
Standard Deviation	5.44	3.88
Variance	29.57	15.03

$t = 7.973$

$P\ (|t| \geq 7.973) < 0.0005$

The affective pretest mean is not equal to, but is significantly greater than the affective pretest mean.

the students' level of knowledge and bias has been raised above the average adults in Klemmack's (1978) study.

Analysis 2

Procedure

The student test scores on all tests were divided according to the mode of instruction the student received. There were test scores for students in each of the four Treatment groups described in Table 2. The means and standard deviations for all cognitive and affective tests of each group were determined. A two-tailed analysis of the pretest was done to determine any significant differences between mean results for the Treatment groups, on both pretests.

In addition, an analysis of variance of the cognitive posttest, and then the affective posttest with both pretests as covariates and Treatment as the main effect were calculated. Similarly a multiple classification, analysis of both posttests by Treatment, with both pretests as covariates was calculated to determine the actual effectiveness of each training group in relation to the pretests.

Results

The means of both the cognitive and affective posttests indicate a significant increase in correct answers for all groups except the control group whose scores actually fell

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TABLE 7

Mean Number of Correct Answers by Group of the Cognitive Assessment of the Aging Education Unit: Significance of the Differences between Pretest and Posttest Means

Group	N	Mean Number Correct		t	Critical value for t at 0.05 significance level
		Pretest	Posttest		
All students	190	21.46	30.50	9.185	1.973
Treatment					
1	69	24.96	30.30	5.308	1.994
2	64	18.02	32.17	8.745	1.998
3	39	19.36	31.05	8.699	2.023
4•	17	26.35	25.52	0.195	2.110
Race					
White	93	23.29	34.50	8.626	1.986
Nonwhite	97	19.36	26.67	5.361	1.985
Sex					
Male	102	20.30	30.71	11.194	1.983
Female	87	23.70	30.61	5.285	1.987
Quarter					
1	91	23.29	30.21	5.420	1.987
2	98	19.99	31.08	7.786	1.984
Grade					
9	44	19.23	27.52	4.398	2.015
10	92	21.98	30.80	6.708	1.986
11-12	53	22.83	33.02	5.122	2.006

• Shows no significant increase during training period. With this exception (Treatment 4 - Control Group), $P(|t| \geq \text{all calculated values}) < 0.0005$

TABLE 8

Mean Number of Correct Answers by Group of the Affective Assessment of the Aging Education Unit: Significance of the Differences between Pretest and Posttest Means

Group	N	Mean Number Correct		t	Critical value for t at 0.05 significance level
		Pretest	Posttest		
All students	190	10.50	14.36	3.853	1.973
Treatment					
1	69	12.09	13.65	3.896	1.994
2	64	7.33	15.57	8.403	1.998
3	39	11.85	14.72	4.420	2.023
4*	17	13.53	12.82	0.817	2.110
Race					
White	93	11.31	15.47	5.997	1.986
Nonwhite	97	9.72	13.30	5.480	1.985
Sex					
Male	102	10.18	15.04	7.211	1.987
Female	87	11.00	13.30	4.110	1.984
Quarter					
1	91	11.93	13.95	3.761	1.987
2	98	9.28	14.90	5.593	1.984
Grade					
9	44	10.30	13.70	3.290	2.015
10	92	11.29	14.95	5.880	1.986
11-12	53	9.49	14.17	9.769	2.006

* Show no significant increase during training period. With this exception (Treatment 4 - Control Group),

$$P(|t| \geq \text{all calculated values}) < 0.001$$

TABLE 9

Relationships among Pretest Scores
Using the 2-tailed t Test
with a 0.05 Confidence Level*

Test	Treatment Comparison	N	t	Significance of t
Cognitive:	1 vs 2	133	8.54	significant
	1 vs 3	108	5.60	significant
	1 vs 4	86	0.95	not significant
	2 vs 3	103	1.34	not significant
	2 vs 4	81	5.70	significant
	3 vs 4	56	5.10	significant
Affective:	1 vs 2	133	8.70	significant
	1 vs 3	108	0.24	not significant
	1 vs 4	86	1.93	approaching significance
	2 vs 3	103	4.52	significant
	2 vs 4	81	4.33	significant
	3 vs 4	56	1.53	not significant

*Refer to Tables 7 and 8 for individual means

TABLE 10

Analysis of Variance - Cognitive Posttest
Main Effect by Covariates:
Cognitive and Affective Pretest Mean Scores

Source of Variation	DF	F	Significance of F
Treatment:			
Covariates	2	37.37	0.000
Cognitive Pretest	1	74.05	0.000
Affective Pretest	1	9.28	0.003
Main Effect			
Treatment	3	10.52	0.000
Race:			
Covariates	2	39.85	0.000
Cognitive Pretest	1	77.82	0.000
Affective Pretest	1	7.76	0.006
Main Effect			
Race	1	28.36	0.000
Sex:			
Covariates	2	32.47	0.000
Cognitive Pretest	1	64.32	0.000
Affective Pretest	1	8.06	0.005
Main Effect			
Sex	1	1.37	0.244
Quarter:			
Covariates	2	32.67	0.000
Cognitive Pretest	1	64.72	-0.000
Affective Pretest	1	8.11	0.005
Main Effect			
Quarter	1	2.52	0.114
Grade:			
Covariates	2	32.73	0.000
Cognitive Pretest	1	64.85	0.000
Affective Pretest	1	8.13	0.000
Main Effect			
Grade	2	1.95	0.146

TABLE 11

Analysis of Variance - Affective Posttest
Main Effect by Covariates:
Cognitive and Affective Pretest Mean Scores

Source of Variation	DF	F	Significance of F
Treatment:			
Covariates	2	1.41	0.248
Cognitive Pretest	1	1.75	0.187
Affective Pretest	1	0.11	0.736
Main Effect			
Treatment	3	7.80	0.000
Race:			
Covariates	2	2.54	0.082
Cognitive Pretest	1	2.80	0.096
Affective Pretest	1	0.34	0.558
Main Effect			
Race	1	12.89	0.000
Sex:			
Covariates	2	1.31	0.273
Cognitive Pretest	1	1.64	0.203
Affective Pretest	1	0.11	0.745
Main Effect			
Sex	1	7.277	0.008
Quarter:			
Covariates	2	1.29	0.277
Cognitive Pretest	1	1.61	0.206
Affective Pretest	1	0.11	0.746
Main Effect			
Quarter	1	4.76	0.030
Grade:			
Covariates	2	1.27	0.282
Cognitive Pretest	1	1.59	0.209
Affective Pretest	1	0.10	0.748
Main Effect			
Grade	2	1.59	0.207

below pretest means as noted on Tables 7 and 8. The means of the Independent Study group showed less than one half the increase in the number correct between pretest and posttest on the cognitive pretest. These facts occur despite the significantly higher pretest scores for both the Independent Study (1) group and Control (4), (Table 9).

The pretest means (Table 9) on the cognitive pretest for Treatment groups 1 (Independent Study) and 4 (Control Group) showed no significant difference. The cognitive pretest means for Treatment groups 2 and 3 likewise showed no significant difference. However, the cognitive pretest means for Treatment groups 2 and 3 were significantly greater than for Treatment groups 1 and 4.

The pretest means (Table 9) on the affective pretest were similar for all Treatment groups, except for the significantly lower mean for Treatment group 2.

Analysis of variance for the cognitive posttest mean scores (Table 10) indicated a highly significant correlation with both covariates, that is both pretests. Likewise, the main effect Treatment, was highly significant, in a positive manner, as indicated by this test.

However, the analysis of variance for the affective posttest indicates no significant correlation (Table 11) with either of the covariate pretests. Treatment did have

TABLE 12

Multiple Classification Analysis - Cognitive Posttest with Adjustments for Covariates: Cognitive and Affective Pretest Mean Scores

Variable	Grand Mean	N	Unadjusted Deviation from Grand Mean	Beta	Deviation from Grand Mean for Covariates	Beta
Treatment:	30.66					
1		69	-0.36		-2.26	
2		64	1.51		3.19	
3		39	0.39		2.09	
4		17	-5.13		2.09	
				0.19		0.36
Race:	30.50					
White		93	3.99		3.14	
Nonwhite		97	-3.83		-3.01	
				0.41		0.32
Sex:	30.66					
Male		102	0.04		0.65	
Female		87	-0.05		-0.76	
				0.01		0.07
Quarter:	30.66					
1		91	-0.45		-1.01	
2		98	0.42		0.93	
				0.05		0.10
Grade:	30.66					
9		44	-3.14		-1.95	
10		92	0.14		0.16	
11-12		53	2.36		1.34	
				0.21		0.13

TABLE 13

Multiple Classification Analysis - Affective Posttest with Adjustments for Covariates: Cognitive and Affective Pretest Mean Scores

Variable	Grand Mean	N	Unadjusted Deviation from Grand Mean	Beta	Deviation from Grand Mean for Covariates	Beta
Treatment:	14.44					
1		69	-0.79		-1.18	
2		64	1.11		1.68	
3		39	0.28		0.32	
4		17	-1.62		-2.25	
				0.25		0.37
Race:	14.36					
White		93	1.11		1.02	
Nonwhite		97	-1.06		-0.98	
				0.28		0.26
Sex:	14.44					
Male		102	0.60		0.67	
Female		87	-0.70		-0.79	
				0.17		0.20
Quarter:	14.44					
1		91	-0.49		-0.63	
2		98	0.46		0.59	
				0.13		0.16
Grade:	14.44					
9		44	-0.73		-0.64	
10		92	0.51		0.48	
11-12		53	-0.27		-0.31	
				0.14		0.13

a significant positive correlation on the results of the affective posttest.

Multiple classification analysis (Table 12) for the cognitive posttest, demonstrates a highly significant negative result in the Control Group (4) below the grand mean, both when unadjusted and adjusted for Treatment and covariates. The other Treatment groups showed little deviation until adjustments for treatment and covariates were made. Then, Treatment Group 2 showed a significantly high positive deviation from the grand mean. Treatment group 3 also showed a significant, but slightly smaller, positive deviation from the mean. Treatment Group 1 results were significantly below the grand mean.

Multiple classification analysis (Table 13) of the affective posttest indicates similar but smaller deviations from the grand mean than those for the cognitive posttest. This was true for both unadjusted and adjusted deviations. However, differences between Treatment Groups 1 and 3 were smaller.

Discussion

The Control Group's (Treatment 4) mean score decrease from pretest level to posttest level may be due to the fact that the Aging Education Unit was taught from December 7, to December 20, 1979. During this time, many students

were working part time and participating in special pre-Holiday festivities and volunteer programs at school, home, church, etc. As is not uncommon at that time of year classes were often shortened and interrupted. This was obviously not an ideal time for teaching the unit. In addition, the students took the posttest on December 20, the last day before winter vacation. Despite the fact that a number of television programs, such as the ABC Theater Special Valentine, showing active Senior Citizens, were being shown during this time (Students in treatment groups 1, 2, and 3 were required to view at least one), and several students in the control group viewed these programs and had small increases on their individual posttest scores, these positive factors still did not out weigh the timing and other possible negative factors. If the time of year the unit was taught affected the control group (Treatment 4) to such a degree, it may also be expected that all of the posttest scores might also have been lower than otherwise expected. This could not be proven from this study. It is suggested that repeating the Aging Education Unit at another time in the school year may indicate if the time during which the unit was taught was significant factor.

The lower cognitive pretest means for treatment groups 2 and 3 are or may be due to several factors:

TABLE 14

Mean Number of Correct Answers
Treatment by Race
on the Cognitive Assessment of the
Aging Education Unit

Treatment by Race	N	Mean Number Correct	
		Pretest	Posttest
1	69	24.96	30.30
1 by White	31	27.65	34.13
1 by Nonwhite	38	22.76	27.18
2	64	18.02	32.17
2 by White	38	20.53	34.61
2 by Nonwhite	36	14.35	28.62
3	39	19.36	31.05
3 by White	17	22.71	37.24
3 by Nonwhite	22	16.77	26.27
4	17	26.35	25.53
4 by White	7	25.29	28.86
4 by Nonwhite	10	27.10	23.20

1. The non-random assignment of students to specific Treatment groups was a definite factor. Students were assigned randomly to health classes, but only 3 teachers' classes were involved. Students were assigned to these classes, after the classes had been chosen, less than two weeks before this study began. Teachers were unaware of the abilities of most of the students at that time. While most classes had several low level students as determined by the BOAT (Table 3) and ITED (Table 4) scores, two Treatment 2 classes had a slightly higher number and one Treatment 3 class had over 50% low level students (14 out of 24 students had failed the BOAT). Low level reading abilities, 4-5 grade or below, were found in the Treatment groups in the same proportion as low level test scores.

2. Cognitive differences were a factor. The greatest number of low level students were later found to be in treatment groups 2 and 3. Those skills or achievements of concern in this study directly related to the material studied were reading, social studies, science, information sources, consumerism, government, community, and while these tests and the reading level of the students are indirect measures of innate cognitive abilities, taken together they represent an indication of the capabilities of the students' abilities.

3. Racial differences (tested later, Table 14) were

TABLE 15

Average Length of Life in Years
for: 1964-Mean Birth Year for Students (Scores Used) in Study
1977-Last Year Statistics Were Available

Year	Group	Average Length of Life in Years
1964		
	Total Population	70.2
	Males	66.8
	Females	73.7
	White	71.0
	Males	67.7
	Females	74.7
	Nonwhite	64.2
	Males	61.3
	Females	67.3
1977	Total Population	73.2
	Males	69.3
	Females	77.1
	White	73.5
	Males	69.7
	Females	77.3
	Nonwhite	68.8
	Males	64.6
	Females	73.1

(Adapted from Life Tables, 1980)

significant, probably in relation to cognitive abilities as noted in (Tables 3 and 4).

4. Less previous knowledge about the aging process, despite the previous study of related topics was of small but significant importance. All cognitive pretest mean scores of Quarter 2 students were lower than for Quarter 1 students and is reflected in the group mean (Table 7). Also teachers of Quarter 2 students reported a high frustration level with the test because students felt they could recognize some of the terms but were unable to relate them to the aging process, and indicated to the teachers that they"should have known the answers".

5. Less knowledge about the aging process may be due to the lack of contact with the very old, due to mobility and longevity. The Life Tables (1980), (Table 15) indicate a significantly lower average length of life for non-whites than whites, and for males than females. In the lower socioeconomic black populations, the students may be "raised" by their grandparents, especially "Granny". But usually these grand parents seem to be quite a bit younger in their 30's, 40's, and 50's compared to children of black and other races whose who were born when their parents had finished their educations. The grandparents of this later group are often older, especially for whites, but frequently

not living in "mushrooming" cities like Dallas where the parents had moved for jobs. Thus these students also may lack a day to day knowledge of aging. Although that may significantly change if elderly grand parents move in to the child's home.

The affective pretest mean scores were affected by all of the items discussed above except that the cognitive effects were most likely limited to reading abilities.

The results of the analysis of variance (Table 10) dramatically demonstrates the correlation between cognitive pretest and posttest mean scores. This clearly indicates the effectiveness of the program, and negates the null hypothesis that the study unit had no effect on the cognition of students. It also seems to imply that some cognitive factors are to be found in the affective pretest. Most dramatically, however, the ANOV demonstrates a very strong significant effect of the Treatment on the cognitive success of the study unit.

Analysis of variance (Table 11) also dramatically demonstrates the effectiveness of the Treatments on the affective success of the Aging Education Unit. While there is a small correlation of the affective posttest to the cognitive pretest it is insignificant, implying that bias and other attitudes are more significant than cognitive

factors on Palmore's Facts on Aging Quiz (Palmore, 1977). That there is any cognitive component is most likely due to an advantage this test has, correct and incorrect answers according to Palmore (1977) are documented.

Multiple classification analysis of the cognitive post-test clearly indicates that:

Treatment 1: Independent study group was not as successful as Treatment 2 and 3. Students, despite their high pretest scores, were required to use their own initiative to ask questions about both assignments and information. Although they had the same time table for completion of assignments as the other students, they had a greater tendency not to complete them. They appeared to be less focused on the assignments and information in the unit, and thus may have been influenced by the pre-holiday atmosphere more than the students in the other treatment groups. They also lacked involvement in a directed exchange of ideas and discussion which the other students had.

Treatment 2: Teacher-oriented group was more directed and organized in their approach to the study unit. However, the differences in the unadjusted and adjusted scores indicate that their lower pretest scores may have had some effect on the significance of their cognitive posttest scores.

Treatment 3: Older role-models group was similar in direction and organization to Treatment Group 2. As in Trent, Glass, and Crockett's (1979) study of 4-H Clubs examples of older adult role models did not result in significantly different changes in information about aging.

Treatment 4: Control group showed a very significant decrease from the grand mean especially when their treatment deviations were adjusted for the covariate pretests.

Multiple classification analysis of the affective posttest showed similar but smaller deviations than the cognitive posttest. However, the deviation from the grand mean for the treatment 2 group was somewhat lower. The explanation for the cognitive posttest seems to apply in all cases on the affective pretest. In addition, however, although Trent, Glass, and Crockett (1979) that amongst all of their treatment groups there was no significant difference in their change in attitude, Drake (1954) indicated that the idea that more intimate contacts with the elderly leads to the breakdown of unfavorable attitudes does not always apply.

In conclusion the mode of Treatment did have an effect on the effectiveness of the curriculum. Treatment groups 2 and 3 were significantly most effective as indicated by the cognitive posttest scores and their analyses. They also were not significantly different in their effectiveness. As

measured by the affective posttest, Treatment Groups 2 and 3 were also significantly most effective although the Treatment 3 group using older role models seemed to show a less significant positive change in attitude.

Analysis 3

Procedure

In order to determine the effects of the other variables, individual scores from students who completed the Aging Education Unit were grouped according to the Race, Sex, amount of previous study (Quarter) and high school Grade of the students. Means were determined for each variable group. Then both analyses of variance tests (using both pretests and covariates), to determine F and the significance of F, and multiple classification analyses adjusted for the covariate pretests, to determine any deviation from mean, were used.

Results

Analysis of variance for the cognitive posttest (Table 10) showed a significant correlation to the both covariate pretests for all variables: Race, Sex, Quarter, and Grade.

Analysis of variance for the affective posttest (Table 11) showed no significant correlation to either or both covariate pretests.

Race

The mean scores of both pretests and both posttests reveal significantly better scores for white vs. non-white students on both the cognitive tests (Table 7) and the affective tests (Table 8). Analysis of variance (Tables 10 and 11) demonstrates a dramatic correlation between Race and the results of both cognitive and affective posttests. The analysis of variance for the affective posttest (Table 11), however, shows a correlation between the covariate cognitive pretest which approached significance. Multiple classification analysis shows that deviations from the grand mean both unadjusted and adjusted for both cognitive and affective posttests were similar (Tables 12 and 13), whites scoring higher than non-whites.

Sex

The mean scores of the cognitive pretest and posttest (Table 7) indicate no significant difference for males vs. females. The mean score on the affective pretest and posttest indicate small, but significantly higher mean scores for males vs. females (Table 8). Analysis of variance shows no significant difference on the cognitive posttest (Table 10), but a significant difference on the affective posttest (Table 11). Multiple and adjusted for the covariates on both the cognitive posttest (Table 12) and the affective posttest (Table 13) indicated that the males scored higher than females.

Quarter

The mean scores of both the cognitive pretest and posttest (Table 7) indicate a small, but not quite significant difference between quarters. The mean scores on the affective pretest and posttest (Table 8) indicate a small, but significantly higher change in mean scores for Quarter 2 students vs. Quarter 1 students. Analysis of variance for the cognitive posttest (Table 10) indicates no significant difference between quarters, but for the affective posttest (Table 11) it indicates a relatively weak ($P \leq 0.03$), but significant differences for Quarters. Multiplication classification analysis of both cognitive and affective posttests, (Tables 11 and 12) indicates that Quarter 2 students were more successful, especially on the affective posttest.

Grade

The means of pretests and posttests, both cognitive and affective indicate no significant differences. Analysis of variance rules out any significant difference between grades, for either posttest (Table 10 and 11). Multiple classification analysis of the cognitive posttest mean scores indicated that students did better in the test the longer they were in school, (Table 12). However, when the affective posttest mean scores were analyzed the pattern was unclear.

Discussion

The significant correlation of the cognitive posttest for both covariate pretests as indicated by analysis of variance, is maintained for all variables seems to indicate a high degree of consistency for the test and correlation with what was previously known on the cognitive pretest and the cognitive components of the affective test.

The lack of such correlation according to analysis of variance of the affective test appears to indicate a low cognitive component for the test, at least in this study.

Race

The significant racial differences indicated by the various analysis of the cognitive tests, may indicate not racial but cognitive ability differences. Tables 3 and 4 imply cognitive abilities for non-whites compared to whites. Also the fact that for the affective posttest the covariate cognitive pretest approached significance using analysis of variance seems to support this hypothesis. Race was a significant variable on the affective tests in this study. But, Storck and Cutler (1979) using the Kogan-Shelton attitudes on Aging Completion test to test students also attending Skyline Center High School, showed only two out of 20 items to have a significant racial difference. It is suggested further studies where possible, include measurements of

the cognitive abilities of the individuals to determine if a significant component of such racial differences is actually cognitive differences.

Sex

The fact that the males were more successful in this study was a bit surprising, since the material is somewhat socially oriented. In particular it was on the affective posttest that the males were significantly more successful. Storck and Cutler (1979) found no gender difference on the Kogan-Shelton attitudes on Aging. Holtzman and Beck (1979) in their study using the same affective test as this study Palmores Facts on Aging Quiz (Palmore, 1977) of individuals in health-related and other occupations showed no significant gender difference. Perhaps, because of the cognitive component on the test, this newer generation of adolescent males was more aware of their early mortality (Table 15) and were more open to changes in attitudes and so forth, which may help them to change this situation compared to their "durable" female cohorts.

Quarter

The differences between Quarters was most likely small since most of the information was new to both groups. However, Quarter 2 students had studied related topics in Quarter 1 health class. It seems that although they did

not recall this material on the pretests, the discussion, review and re-organization of that information may account for the improvement of Quarter 2 students on both posttests although it was only significant for the affective posttests. The fact that the similar, but not quite significant change also took place, for the cognitive test also supports the hypothesis that in addition to providing new information, previously learned information was re-enforced by this program.

Grade

Grade of students implies age and it is expected that as one experiences life one may acquire more information. Such a pattern of change was found for the cognitive posttest only but it was not significant, possibly because of the small age range. The affective posttest showed no significant patterns of change, possibly because attitudes are less affected by age within such a small range. In addition Holtzman and Beck (1979) found only a weak association between age and correct scores on Palmore's Facts on Aging Quiz with an age range of 17 to 68.

Therefore Race was the only variable which had a significant relationship with, or effect on all the considerations; previous knowledge and prejudices (Cognitive and Affective Pretest Scores) and the effectiveness of the

TABLE 16

Mean Number of Correct Answers
Treatment by Race
on Palmore's Facts on Aging Quiz

Treatment by Race	N	Mean Number Correct	
		Pretest	Posttest
1	69	12.09	13.65
1 by White	31	13.36	14.74
1 by Nonwhite	38	11.05	12.76
2	64	7.33	15.57
2 by White	38	8.29	16.32
2 by Nonwhite	26	5.92	14.42
3	39	11.85	14.72
3 by White	17	12.88	16.24
3 by Nonwhite	32	11.05	13.55
4	17	13.53	12.82
4 by White	7	14.86	12.29
4 by Nonwhite	10	12.60	13.20

TABLE 17

Mean Number of Correct Answers
Treatment by Sex
on the Cognitive Assessment of the
Aging Education Unit

Treatment by Sex	N	Mean Number Correct	
		Pretest	Posttest
1	69	24.96	30.30
1 by Male	37	23.22	29.92
1 by Female	32	26.97	39.75
2	64	18.02	32.17
2 by Male	36	17.78	33.33
2 by Female	28	18.32	30.68
3	39	19.36	31.06
3 by Male	21	18.50	31.05
3 by Female	18	20.33	31.06
4	17	26.35	25.53
4 by Male	8	22.88	21.63
4 by Female	9	29.44	29.00

TABLE 18

Mean Number of Correct Answers
Treatment by Sex
on Palmore's Facts on Aging Quiz

Treatment by Sex	N	Mean Number Correct	
		Pretest	Posttest
1	69	12.09	13.65
1 by Male	37	12.16	14.35
1 by Female	32	12.00	12.84
2	64	7.33	15.57
2 by Male	36	6.59	16.53
2 by Female	28	8.29	14.29
3	39	11.85	14.72
3 by Male	21	11.86	14.67
3 by Female	18	11.83	14.78
4	17	13.53	12.82
4 by Male	8	12.75	12.50
4 by Female	9	14.22	13.11

TABLE 19

Mean Number of Correct Answers
Treatment by Previous Related Study (Quarter)
on the Cognitive Assessment of the
Aging Education Unit

Treatment by Quarter	N	Mean Number Correct	
		Pretest	Posttest
1	69	14.96	30.30
1 by Quarter 1	45	25.11	31.02
1 by Quarter 2	24	24.67	28.96
2	64	18.02	32.17
2 by Quarter 1	22	23.14	29.18
2 by Quarter 2	42	15.33	33.74
3	39	19.36	31.05
3 by Quarter 1	24	20.00	29.63
3 by Quarter 2	15	18.33	33.33
4	17	26.35	25.53
4 by Quarter 1*	—	—	—
4 by Quarter 2	17	26.35	25.53

* Control group (Treatment Group 4) Did not include pretest and posttest scores of Quarter 1 students

TABLE 20

Mean Number of Correct Answers
Treatment by Previous Related Study (Quarter)
on Palmore's Facts on Aging Quiz

Treatment by Quarter	N	Mean Number Correct	
		Pretest	Posttest
1	69	12.09	13.65
1 by Quarter 1	45	11.71	13.80
1 by Quarter 2	24	12.79	13.37
2	64	7.33	15.57
2 by Quarter 1	22	11.71	13.73
2 by Quarter 2	42	4.76	16.00
3	39	11.85	14.72
3 by Quarter 1	24	12.08	14.42
3 by Quarter 2	15	11.47	15.20
4	17	13.53	12.82
4 by Quarter 1*			
4 by Quarter 2	17	13.53	12.82

* No Quarter 1 student scores were available for this study.

TABLE 21

Mean Number of Correct Answers
Treatment by Grade
on the Cognitive Assessment of the
Aging Education Unit

Treatment by Grade	N	Mean Number Correct	
		Pretest	Posttest
1	69	24.96	30.30
1 by Grade 9	7	20.00	23.57
1 by Grade 10	40	24.48	29.70
1 by Grade 11-12	22	27.41	33.55
2	64	18.02	32.17
2 by Grade 9	24	20.96	30.75
2 by Grade 10	21	16.76	33.19
2 by Grade 11-12	19	15.68	32.84
3	39	18.02	32.17
3 by Grade 9	13	15.62	30.75
3 by Grade 10	21	21.33	33.86
3 by Grade 11-12	5	20.80	38.40
4	17	26.35	25.53
4 by Grade 9*			
4 by Grade 10	10	24.30	23.80
4 by Grade 11-12	7	29.29	28.00

* Pretest and Posttest scores of Treatment Group 4, Grade 9 students were not available.

TABLE 22

Mean Number of Correct Answers
Treatment by Grade
on Palmore's Facts on Aging Quiz

Treatment by Grade	N	Mean Number Correct	
		Pretest	Posttest
1	69	12.09	13.65
1 by Grade 9	7	12.29	12.71
1 by Grade 10	40	12.00	13.50
1 by Grade 11-12	22	12.18	14.23
2	63	7.33	15.53
2 by Grade 9	24	8.67	14.79
2 by Grade 10	21	8.86	17.95
2 by Grade 11-12	19	3.94	13.84
3	39	11.85	14.72
3 by Grade 9	13	12.23	12.23
3 by Grade 10	21	11.71	15.57
3 by Grade 11-12	5	11.40	17.60
4	17	13.53	12.29
4 by Grade 9*			
4 by Grade 10	10	12.70	13.10
4 by Grade 11-12	7	14.72	12.43

* Pretest and Posttest scores of Treatment Group 4, Grade 9 students were not available.

program as measured by cognitive and affective tests. While small differences occurred on the cognitive and affective pretests for Sex (gender) and Quarter of study they had no significant effect on the program as measured by the cognitive posttest, but did influence the effectiveness of the program as measured by the affective posttest. Grade had no effect. It was hypothesized that at least some of the racial effects were due to cognitive differences which were not determined. But it is also significant that both Racial groups showed a significant gain in relation to the aging process as measured by cognitive and effective tests.

Analysis 4

Procedure

Students score on the cognitive pretest and posttest and the affective pretest and posttest were grouped according to the treatment and then each treatment group was subdivided on the basis of four variables; Race, Sex, previous study in a health class (Quarter) and Grade. Means were determined (Tables 14, 16, 17, 18, 19, 20, 21, and 22) for each subgroup and then the means of the pretest and posttest scores were used of comparisons. Analysis of variance using both pretests as covariates was used to determine if there was a significant change measured by

TABLE 23

Analysis of Variance - Cognitive Posttest
Treatment by Other Main Effects by Covariates:
Cognitive and Affective Pretest Mean Scores

Source of Variation	DF	F	Significance of F
Treatment by Race:			
Covariates	2	41.42	0.000
Cognitive Pretest	1	82.06	0.000
Affective Pretest	1	10.28	0.002
Main Effects	4	13.87	0.000
Treatment	3	7.95	0.000
Race	1	20.51	0.000
2-way Interaction Treatment by Race	3	1.10	0.352
Treatment by Sex:			
Covariates	2	37.34	-0.000
Cognitive Pretest	1	73.98	0.000
Affective Pretest	1	9.27	0.003
Main Effects	4	8.31	0.000
Treatment	3	10.56	0.000
Sex	1	1.72	0.191
2-way Interaction Treatment by Sex	3	0.71	0.549
Treatment by Quarter:			
Covariates	2	42.66	-0.000
Cognitive Pretest	1	84.51	-0.000
Affective Pretest	1	10.59	0.001
Main Effects	4	11.51	0.000
Treatment	3	14.25	0.000
Quarter	1	10.03	0.002
2-way Interaction Treatment by Quarter	3	9.42	0.000
Treatment by Grade:			
Covariates	2	40.09	-0.000
Cognitive Pretest	1	79.43	0.000
Affective Pretest	1	9.96	0.002
Main effects	4	10.29	0.000
Treatment	3	15.56	0.000
Grade	1	8.88	0.000
2-way Interaction Treatment by Grade	3	11.19	0.744

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TABLE 24

Analysis of Variance - Affective Posttest
Treatment by Other Main Effects by Covariates:
Cognitive and Affective Pretest Mean Scores

Source of Variation	DF	F	Significance of F
Treatment by Race:			
Covariates	2	1.45	0.258
Cognitive Pretest	1	1.80	0.181
Affective Pretest	1	0.12	0.732
Main Effects	4	7.68	0.000
Treatment	3	5.65	0.001
Race	1	6.66	0.011
2-way Interaction Treatment by Race	3	0.84	0.475
Treatment by Sex:			
Covariates	2	1.47	0.233
Cognitive Pretest	1	1.84	0.177
Affective Pretest	1	0.12	0.730
Main Effects	4	8.29	0.000
Treatment	3	8.32	0.000
Sex	1	8.66	0.004
2-way Interaction Treatment by Sex	3	1.26	0.291
Treatment by Quarter:			
Covariates	2	1.60	0.205
Cognitive Pretest	1	2.00	0.157
Affective Pretest	1	0.13	0.719
Main Effects	4	8.86	0.000
Treatment	3	9.85	0.000
Quarter	1	8.81	0.003
2-way Interaction Treatment by Quarter	3	9.69	0.000
Treatment by Grade:			
Covariates	2	1.56	0.214
Cognitive Pretest	1	1.94	0.165
Affective Pretest	1	0.13	0.723
Main Effects	4	7.70	0.000
Treatment	3	11.55	0.000
Grade	1	6.29	0.002
2-way Interaction Treatment by Grade	3	2.83	0.018

the posttests considering the cognitive and affective pretests as covariates and the main effects of Treatment and the variable chosen. Also analysis of variance was used to determine any two-way interactions between treatment and the variable. In addition a multiple classification analysis of each posttest was performed using the cognitive and affective test means as an independent factor. This analysis also ranked the Treatment and variable types according to unadjusted and adjusted deviations from the grand mean.

Results

As in the single main factor analysis of variance of the cognitive posttest means for all of the variables, when treatment in addition to one other variable is analyzed a significant correlation is found for both covariate pretests (Table 23).

However, when the affective posttests mean scores are analyzed, both in the case of each variable alone or treatment with another independent variable no significant could be determined for either or both covariates (Cognitive Pretest and Affective Pretest) as shown on Table 24.

Treatment by Race

The main effects Treatment and Race are both significant (Table 23) according to analysis of variance for the

TABLE 25

Multiple Classification Analysis - Cognitive Posttest with Ajustments for Covariates; Cognitive and Affective Pretest Mean Scores and Treatment by Other Main Effects

Variable	N	Unadjusted Deviation from Grand Mean	----Beta	Deviation from Grand Mean Adjusted for Independents and Covariates	-----Beta
Treatment by Race:					
Treatment-1	69	-0.36		-1.71	
2	64	1.51		2.21	
3	39	0.39		2.33	
4	17	-5.13		-6.72	
			0.19		0.30
Race- White	93	3.83		-2.57	
Nonwhite	97	-3.71		2.49	
			0.40		0.27
Treatment by Sex:					
Treatment-1	69	-0.36		-2.29	
2	64	1.51		3.21	
3	39	0.39		2.12	
4	17	-5.13		-7.62	
			0.19		0.36
Sex- Male	102	0.04		0.68	
Female	87	-0.05		-0.79	
			0.01		0.08
Treatment by Quarter:					
Treatment-1	69	-0.36		-1.80	
2	64	1.51		2.97	
3	39	0.39		2.55	
4	17	-5.13		-9.74	
			0.19		0.40
Quarter-1	91	-0.45		-1.92	
2	98	0.42		1.72	
			0.05		0.20
Treatment by Grade:					
Treatment-1	69	-0.36		-3.00	
2	64	1.51		4.04	
3	39	0.39		2.66	
4	17	-5.13		-9.11	
			0.19		0.45
Grade-9	44	-3.14		-4.20	
10	92	0.14		0.75	
11-12	53	2.36		2.19	
			0.21		0.25

TABLE 26

Multiple Classification Analysis - Affective Posttest with Adjustments for Covariates: Cognitive and Affective Pretest Mean Scores and Treatment by Other Main Effects

Variable	N	Unadjusted Deviation from Grand Mean	-----Beta	Deviation from Grand Mean Adjusted for Independents and Covariates	-----Beta
Treatment by Race:					
Treatment-1	69	-0.79		-1.03	
2	64	1.11		1.41	
3	39	0.28		0.38	
4	17	-1.62		-2.00	
			0.25		0.32
Race- White	93	1.03		0.71	
Nonwhite	97	-1.00		-0.69	
			0.27		0.19
Treatment by Sex;					
Treatment-1	69	-0.79		-1.22	
2	64	1.11		1.70	
3	39	0.28		0.34	
4	17	-1.62		-2.21	
			0.25		0.38
Sex- Male	102	0.60		0.69	
Female	87	-0.70		-0.81	
			0.17		0.20
Treatment by Quarter:					
Treatment-1	69	-0.79		-0.98	
2	64	1.11		1.59	
3	39	0.28		0.52	
4	17	-1.62		-3.17	
			0.25		0.39
Quarter- 1	91	-0.49		-0.84	
2	98	0.46		0.78	
			0.13		0.22
Treatment by Grade					
Treatment- 1	69	-0.79		-1.55	
2	64	1.11		2.05	
3	39	0.28		0.40	
4	17	-1.62		-2.71	
			0.25		0.46
Grade- 9	44	-0.73		-1.55	
10	92	0.51		0.77	
11-12	53	-0.27		-0.05	
			0.14		0.25

cognitive posttest. However, the 2-way interactions of Treatment X Race were significant for the cognitive posttest.

Treatment and Race were also significant on the affective posttest (Table 24) according to analysis of variance. But, 2-way interactions between Treatment and Race also were not significant.

On multiple classification analysis of the cognitive posttest, however, both covariate pretests, Treatment 2 and 3's deviations not only become approximately equal but Treatment 3 deviation actually increases to slightly above the level of Treatment 2 (Table 25). The deviation decreased from the grand mean for both races when adjusted for Treatment and covariate pretests.

When the affective posttest mean scores were analyzed by multiple classification analysis, when Treatment was adjusted for race and covariates, there was little effect on the deviation from the grand mean, (Table 26). The reciprocal adjustment also showed little changes.

Treatment by Sex

On the cognitive posttest (Table 23), analysis of variance indicates a significant effect for treatment and possibly a weak effect for sex. This possible effect was also found when sex alone was considered but it was not

significant. Also no 2-way interaction of Treatment X Sex was found.

On the affective posttest (Table 24), analysis of variance indicates a significant effect for both Treatment and Sex. These also were noted when these variables were considered alone. However, no 2-way interaction of Treatment X Sex was found.

Multiple classification analysis of the cognitive posttest revealed that although the effectiveness of Treatment 2 and 3 was emphasized when Treatment was adjusted for Sex, whe Sex was adjusted for Treatment there was only a small change (Table 25).

Multiple classification analysis of the affective posttest revealed little change (Table 26) when Treatment was adjusted for Sex although the teacher-oriented mode of instruction seemed to be a bit more effective than the older role-model mode. However, no change occurred when Sex adjusted for Treatment.

Treatment by Quarter

Analysis of variance of the Cognitive posttest results (Table 23) indicates significant effects for both Treatment and Quarter. In addition a very significant 2-way interaction of Treatment by Quarter was detected.

Analysis of variance on the affective posttest results

(Table 24) indicates significant effects for both Treatment and Quarter. In addition, a significant 2-way interaction of Treatment by Quarter was detected.

Multiple classification analysis of the cognitive posttest (Table 25) revealed that when the deviations from the grand mean for Treatment were adjusted for Quarter and both covariate pretests, the effectiveness of Treatments 2 and 3 were emphasized. The reciprocal adjustment of Quarter by Treatment and both covariate pretests also emphasized the success of Quarter 2. Treatment 4 showed a very negative correlation to the grand mean even when the deviation was adjusted as indicated above.

Multiple classification analysis of the affective posttest (Table 26) revealed that even when the deviations from the Grand Mean were adjusted for Quarter and both covariate pretests, little change occurred except to emphasize the negative effects of Treatment 4 (Control Group). The reciprocal analysis showed little effect even when adjusted.

Treatment by Grade

Analysis of variance on the cognitive posttest (Table 23) indicates effects for both Treatment and Grade. However, no 2-way interactions of Treatment by Grade were found.

Analysis of variance on the affective posttest (Table 24) indicates significant effects for both Treatments and Grade. In addition a moderately significant 2-way inter-

action for Treatment by Grade was detected.

Multiple classification analysis (Table 25) of the cognitive posttest results indicate that when the deviations from the grand mean for Treatment were adjusted for Quarter and both covariate pretests, the negative deviation from the grand mean for Treatment Group 4 (Control Group) is emphasized as is the negative deviation for 9th graders in the reciprocal analysis.

Multiple classification analysis (Table 26) of the affective posttest indicates that for both unadjusted and adjusted deviations from the grand mean for Treatment, Treatment Group 2 was slightly more significant than Treatment Group 3, but both were more significant than the other Treatment Groups. When Grade was adjusted for Treatment and the covariate pretests, the 9th Grade seemed to have somewhat less success on this study unit.

Discussion

Treatment by Race

Although Treatment and Race are significant variables there was no significant 2-way interaction between them. Although multiple classification analysis of the cognitive posttest revealed that when Treatment was adjusted for Race and the covariate pretests, Treatment Group 3 (Older role-model)'s deviation was the only example where any treatment

had a greater positive deviation than for Treatment 2, it could not be determined from this study if the reason was due to greater effectiveness of Treatment 3 with lower cognitive level student within this group and/or the older role-models themselves which individual students may not have previously experienced as is implied by the Life Tables (1980; Table 14). However, preliminary analysis of a delayed (2 months) subset test indicated that students of both races in the Treatment group also did as well or better than Treatment Group 2 students. This is interesting because white students in Treatment Group 3, with greater cognitive abilities were the most successful group in this study, but the role models for the lower ability non-white sample seem to have produced a similar long term effect. This also suggests that further delayed testing and analysis of the results is necessary to draw specific conclusions.

Results of the Affective Posttest indicated that the effects of either Treatment or Race was modified by the other so that differences were not as pronounced either among Treatment Groups or between Races. Race thus influenced the cognitive results to a greater degree than any affective results. This tends to support the idea that cognitive differences do indeed exist between the races in this sample as was also observed on standardized test scores for the

student body from which this sample was drawn (Hardie et al, 1979; Tables 3 and 4). Also these differences may be modifying components of the Affective tests.

Treatment by Sex

The differences which were apparent when Sex and Treatment were considered, were most significant for the Affective Posttest. On the Cognitive Posttest, Treatment was a significant factor while Sex had only a weak but insignificant effect. Holtzman and Beck (1979) and Storck and Cutler (1979), as noted when sex alone was considered, demonstrated no significant differences. This seems to be a sample variation, since Holtzman and Beck (1979) also used the Palmore Facts on Aging Quiz in their study, and since Storck and Cutler (1979) used data collected from the same student body as in this study. However, with the awareness of the 1980 census, perhaps at least some of the males were more aware of the earlier death age (Table 15) for males in the United States and were more responsive to information and attitudes from the Aging Education Unit that might enhance their chances for a good long life.

Treatment by Quarter

The effects of the comparison of the interaction between Treatment and Quarter were probably most significantly modified by the fact that Treatment Group 4 (Control Group)

did not contain Quarter 1 students. The only variables showing a significant 2-way interaction are those which are partially missing in the Control, specifically Quarter and Grade. Quarter alone only approached significance on the Cognitive Posttest although it was weakly significant on the Affective Posttest. Also, a review of the means of both pretests and both posttests (Tables 7 and 8) indicates that Quarter 2 students had lower pretest scores and higher posttest scores than Quarter 1 students. The exception was that Quarter 2 students in Treatment Group 1, although they had one of the highest pretest mean scores, they had the lowest posttest scores, excluding the Control Group. All of this suggests that the improvement in the Quarter 2 scores may be due to the rehersal of previously studied information, providing "new" categories and recall cues for the information and suggesting greater "personal" significance for the material studied. While more testing is needed to provide more support for this hypothesis, it suggests that Aging Education may have a more significant effect if the information presented is correlated to other information the students study during their school years. The Acton, Massachusetts School District is developing their Aging Education Program, using some of the same materials contained in this Study Unit, to take advantage of this concept (Pratt,

Personal Communication, November 3, 1979). It should be noted that the results of the multiple classification analysis for both posttests that directed study with either the teacher alone or with role models is necessary for the most effective program.

Treatment by Grade

Although Grade alone had only a weak and insignificant effect on the results of the Cognitive Posttest and no effect on the Affective Posttest, Grade when analyzed with Treatment had a significant effect on the Cognitive Pretest (Table 23) and a slightly weaker effect on the Affective Posttest. It is suggested that this was least partially due to the fact that there were no test scores of Grade 9 students available from the Control Group, Treatment Group 4. Also a review of the mean score of both Cognitive and Affective Pretests and Posttests (Tables 6, 7, 20, and 21) indicated mixed results, but generally lower mean scores for Grade 9 students. The Treatment 1, Independent Study Group, Grade 9 students showed little change on the cognitive tests, the mean score increased from 20.00 to 23.57, and no significant change was noted on the affective test scores. On the cognitive tests Grade 9, Treatment Group 3 students had the lowest mean scores. The change in their mean scores was 15.62 to 23.69. No significant change was

noted on the affective tests. The very low mean on the Cognitive Pretest seems to indicate a low level of information about aging and the aging process, however, it also seems to be indicative of lower cognitive abilities. Test results such as those in Tables 3 and 4 were unavailable for the Grade 9 students. Later during the same quarter term over one half of the Grade 9, Quarter 1, Treatment Group 3 students and several of the Grade 9, Quarter 2, Treatment Group 3 students had to retake the BOAT, due to failure to achieve a passing score in 1979. Thus it appears that in this group, Treatment 3, Grade 9 (especially non-white), there is a high proportion of students with low cognitive abilities. This is supported by the unusally high proportion of students in Grade 9 and Treatment Group 3 in the Remedial Reading Program at Skyline. To qualify for this program students' reading level had to be below Grade 6. According to Reading Department records, 7 out of 10 Grade 9 students in Treatment Group 3 qualified for Remedial Reading. It is very significant that these students were successful in their studies on aging. Thus it seems apparent that cognitive abilities did have an effect on the test results, as indicated by the fact that Grade became a significant factor only when it was analyzed with Treatment. This is further supported by multiple classification analysis

which emphasized the modifying effect of Grade on Treatment (Table 24) although there is no significant 2-way interaction. Also it should be noted that the effect of Grade on Treatment may be an artifact of this particular group of students because of the absence of Grade 9 students and the observed differences in cognitive abilities in the subgroups.

Likewise, both the absence of Grade 9 students in the Control Group and the differences in cognitive abilities may be factors on the affective tests too. Multiple classification analysis also indicates both Treatment and Grade to be significant factors. But when Grade was considered alone it was not a significant factor. It was even a less significant factor on the Affective Posttest than on the Cognitive Posttest. In addition there was a significant 2-way interaction between Grade and Treatment, although the Grade 10 students seemed to be most successful on the affective posttest. This also may be an artifact of the particular subgroups of students since the samples generally include larger numbers (21 or more) Grade 10 students and the small sample sizes of 5 and 7 when Treatment Groups are subdivided by Grade, and also since there are no Grade 9 students in the control and observable cognitive differences between the subgroups.

Summary

Thus the same variables which were significant alone were also significant when analyzed by Treatment. Only Quarter showed a significant 2-way interaction on both post-tests. Quarter also became a significant variable on the Cognitive Posttest, and a more significant variable on the Affective Posttest. Grade had a small but significant 2-way interaction and similar to Quarter became a significant variable when it was considered with Treatment. It was suggested that the fact that Quarter and Grade 9 were missing in the Control Group was significant. Small sample size for some of the subgroups may also have been a factor. However, cognitive factors which could not be specifically determined, seemed to be of sufficient consequence that more testing is required

Analysis 5

Finally, the question of the reliability and accuracy of Palmore's Facts on Aging Quiz (Palmore, 1977; Table 1) as an affective measurement tool arrises. Palmore (1977, 1979) admits that there is an important cognitive component since the correct answers are documented and thus the answers do not express "pure" attitudes. Yet Palmore developed this quiz to also be an indirect measure of bias. The previous analyses of this study indicated no significant correlation

TABLE 27

Mean Number of Incorrect Answers by Group on the Palmore Facts on Aging Quiz

Group	N	Mean Number Incorrect
Dental students	161	8.96
Medical students	123	7.40
Registered Nurses	70	8.76
Aides and Orderlies	45	11.22
Dental Assistants	35	10.00
Technicians	34	9.76
Licensed Practical Nurses	30	9.66
Other (Secretaries clerks, etc.)	16	9.00

*Adapted from Holtzman and Beck (1979).

of the Affective (Palmore's Facts on Aging Quiz) Posttest mean scores with either the Cognitive or Affective Pretest Scores (Tables 11 and 24), although all of the Cognitive Posttest mean scores correlated significantly with those of the Cognitive and Affective Pretest (Tables 10 and 23). These facts alone imply that although a cognitive component exists, the Affective Test is somewhat independent of cognitive information. Specifically it appears to be indepen dent of the Cognitive Test used in this study (Table 5).

Klemmack (1978) suggested that the Palmore Facts on Aging Quiz was more an indicator of bias than information, but was lacking in internal consistency, i.e. 18 or 72% of the items had no significant relationship to the total score, and of the remaining seven, only four had the predicted positive relationship.

Holtzman and Beck (1979) questioned this, and performed an item by item analysis of Palmore's Quiz, calculating Chi squares by response and occupational group for each item. They also calculated the analysis of variance for the means of the incorrect answers by occupational group (Table 27). They concluded that ". . . on the whole (it) does indeed distinguish between levels of knowledge by occupational groups. Further the ocerwhelming majority of the items taken individually do appear to have descriminatory power". Thus the

TABLE 28

Mean Number of Incorrect Answers by Group on the Palmore Facts on Aging Quiz

Group	N	Mean Number Incorrect	
		Pretest	Posttest
All Students	190	14.37	10.37
	154•	12.25	
Treatment Group			
1	69	12.98	11.35
2	64	17.67	9.53
3	39	13.15	10.29
4	17	11.48	12.18
Race			
White	93	13.79	9.53
Non-white	97	15.28	11.70
Sex			
Male	102	14.82	9.96
Female	97	14.00	10.26
Quarter			
1	91	13.07	11.05
2	98	15.72	10.10
Grade			
9	44	14.70	11.30
10	92	13.71	10.05
11-12	53	15.51	10.83

test was suitable for determining knowledge. But, when they calculated the Peason product moment coefficient between the total number missed and an overall measurement of attitudes which was also administered to all respondants, they concluded that ". . . Palmore's quiz was a relatively poor indirect measure of bias". In order to determine if the use of the Palmore Facts on Aging Quiz was a valid measure of bias in this study it was analyzed in detail.

Procedure

Means of the incorrect answers on the test as total group and according to the variables were calculated for comparison with Holtzman and Beck (1979), (Tables 27 and 28.

Then Palmore's Facts on Aging Quiz was reviewed to determine what questions exhibited no bias. According to Palmore (1977) these were questions 15, 19, 20 and 23 on Table 1. However, it was determined that question 15, expressing that old people fit a stereotype was negatively biased. The neutral questions were then eliminated from consideration. A revision code was set up to "correct" for the positive direction of bias (when an incorrect answer is given) of questions 2, 4, 6, 12, 14.

Students individual responses on the affective tests were reviewed. All tests with more than one blank answer on the total test were removed from consideration for the item

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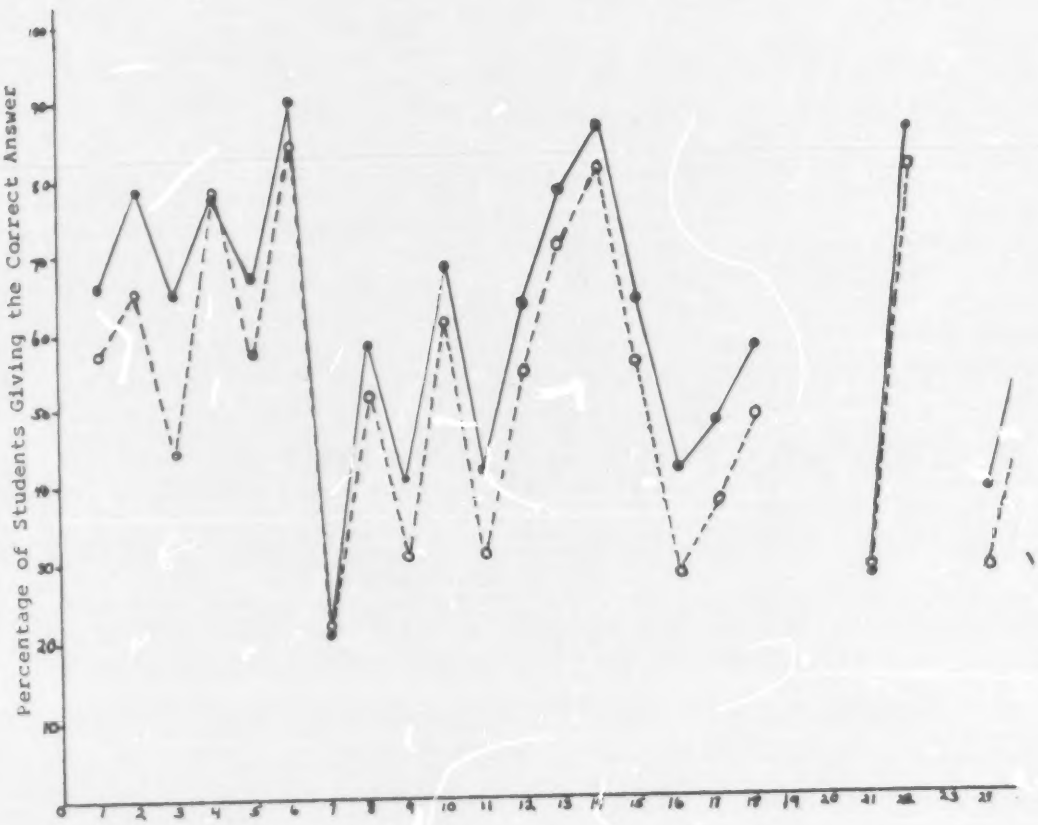
FIGURE 1

Percentage of Students Giving the Correct Answers on the
Affective Pretest and Posttest
Palmore Facts on Aging Quiz
(Palmore, 1977)



Question Number on the Palmore Quiz

*Non-biased items 19, 20 and 23 were not included.
Question 15 was given a negative bias-stereotyping.

Pretest o---o
Posttest ●—●

to item total score analysis. This reduced the pretest sample to 154 sets of test score. The posttest sample remained at 190. The mean and median of the "new" pretest sample was calculated to determine if the sample was normal. Choice distributions (percentages) of true and false answers were determined for all questions, from which percentages of correct and incorrect answers were determined as well as rankings for comparison with Holtzman and Beck's (1979) results. Pro and Anti Aged Bias scores were determined for comparison with Palmore (1977).

An alpha value for both pretest and posttest scores was calculated as a measure of internal consistency considering all split-test variations. Likewise, an R (multiple correlation coefficient) value was calculated for each question on the pretest and posttest. The R value was then compared to the R value significant at the 0.0025 level on a 1-tailed t test and significant items were marked and compared to Klemmack (1978). The R value determined the consistency of each question with the total score. Also an evaluation of questions 1, 5, 9, 11, 13, and 15 was made to determine if the actually showed the most bias an indicated by R. Comparisons between the pretest and posttest as a whole and by item (Figure 1) were made.

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TABLE 29

Item Characteristics of Palmore' Facts on Aging Quiz
Percent Correct and Bias

Item	Bias[a]	Adults[b]	Duke University[c]			High School Students[d]	
			Undergraduate Students	Graduate Students	Faculty	Pretest	Posttest
1	-	87	93	100	100	58	65
2	+	61	60	86	73	66	79
3	-	75	84	98	100	45	64
4	+	76	79	84	91	79	78
5	-	78	88	100	100	58	68
6	+	95	98	93	100	86	91
7	-	23	26	73	100	23	21
8	-	53	60	73	82	53	59
9	-	48	73	98	100	32	39
10	-	80	91	100	100	63	69
11	-	53	53	91	100	32	43
12	+	69	53	70	91	55	64
13	-	87	95	100	100	73	79
14	+	96	93	93	93	82	87
15	(-)	70	91	98	100	58	64
16	-	33	26	27	45	29	42
17	-	44	58	84	100	38	47
18	-	58	58	82	100	49	58
19		20	14	45	64	••	••
20		48	44	91	91	••	••
21	-	19	26	50	55	29	28
22	-	92	98	89	64	81	86
23		13	37	56	82	••	••
24	-	31	42	27	100	29	39
25	-	32	79	82	82	51	65
Percent Correct		55 60.9*	65 69.27*	80 85.55*	90 98.8*	55.7*	61.68*

*Items 19, 20, and 23 removed from consideration - no bias.

a - Bias of an incorrect answer (Palmore,1977) - negative bias added to 15
b - Adults from a Southern city, mean age 40.2, mean education 13.6, most married, euqual numbers of males and females (Klemmack, 1978)
c - (Palmore, 1977)
d - Skyline Center health students

Results

Uncorrected (neutral questions not removed) means of incorrect answers (Table 28) were compared to those of Holtzman and Beck (1979; Table 27) and it was noted that the present scores were significantly lower than those of individuals in medicine and related occupational fields. Posttest score, however, brought students' affective scored within proximity to those of Dental Assistances, and Aids and Orderlies, (Table 28).

The percent total correct answers on Palmores Facts on Aging Quiz (Table 28) indicated that the scored slightly below (55.7% vs 60.9%) Southern adults whose mean age was 40.2 and had a mean education of 13.6 years (Klemmack, 1978) on the posttest their scoes were just above Klemmack's (1978) sample (60.9% vs 61%) and slightly below 61% vs 65%) under-graduate sociology student (Palmore, 1977).

Similarities (Table 29) between the percent correct for each item were noticed among all groups, although the Faculty (Human Development) sample far excelled all other groups in the percent of correct answers (Palmore, 1977). The Human Development Faculty and graduate students (Palmore, 1977) scored significantly higher on item 7, while on items 1, 3, 10, and 15 the school students scored significantly lower. The scores of the high school students though lower, showed

TABLE 30

Palmore Facts on Aging Quiz
Rank Order of Missed Items
and Percent Incorrect and Percent Correct
for Students on Pretest and Posttest

Item Number	Pretest (N=154)			Posttest (N=190)		
	Rank*	Percent Incorrect	Percent Correct	Rank*	Percent Incorrect	Percent Correct
1	15	42	58	13.5	35	65
2	17	34	66	18.5	21	79
3	8	55	45	10	37	64
4	19	21	79	17	22	78
5	13	43	58	15	32	68
6	22	15	86	22	9	91
7	1	77	23	1	79	21
8	10	47	53	9	41	59
9	5	68	32	3	61	39
10	16	37	63	16	31	69
11	6	69	32	5.5	58	43
12	11	45	55	11.5	36	64
13	18	27	73	18.5	21	79
14	21	18	82	21	13	87
15	13	43	58	11.5	36	64
16	3.5	71	29	5.5	58	42
17	7	62	38	7	52	47
18	9	52	49	8	42	58
19	**	**	**	**	**	**
20	**	**	**	**	**	**
21	2	72	28	2	72	28
22	20	20	81	20	14	86
23	**	**	**	**	**	**
24	3.5	71	29	4	61	39
25	13	43	51	13.5	35	65

* Lower numbers indicate most frequently missed items
** Non-biased item - removed from consideration

a similar pattern when compared with the other groups. In addition, as also noted on Figure 1, there was no change on items 7 and 21 as a result of the Aging Education Unit. However, the answers on question 16 (also noted below as having the highest R value, item to total consistency, on the pretest) improved from a pretest 29% correct, (just above the undergraduate students 26% and 27% correct) to a posttest value of 42% just below the 45% correct score of the Duke University Human Development Faculty (Palmore, 1977).

The ranking according to the percent of incorrect questions (Table 30) was similar to that of Holtzman and Beck's (1979) study of medical and related personnel. Removal of the neutral items altered the rankings by only a small degree. Since the comparison of the percentages of correct answers (Table 29) of the pretest, posttest, Duke University undergraduate and graduate students and faculty (Palmore, 1977), and Southern adults with some college education (Klemmack, 1978) support a similarity in the results, it appears that, as Holtzman and Beck (1979) suggest, that despite the differences in background and education, similar myths prevail among much of society.

The mean for the Facts on Aging Quiz (Palmore, 1979), Affective Pretest corrected by removal of the nonbiased or neutral questions, was 12.753, the median was 12.97 and the

TABLE 31

Pro and Anti Aged Errors
Bias Scores

Group	N	Mean % Pro-errors	Mean % Anti Errors	% Pro Errors minus % Anti Errors
• Undergraduate students	87	26	33	-7
• Graduate students	44	15	20	-6
• Faculty	11	9	11	-2
•• High School students (Pretest)	154	26.6	52.88	-26.28
•• High School students (Posttest)	190	18.4	44.94	-26.54

• (Palmore, 1977)

•• Mean % Pro Errors decreased by 8.2% during treatment.
Mean % Anti Errors decreased by 7.94% during treatment.

TABLE 32

Item Characteristics of Palmore's Facts on Aging Quiz
Item to Total Correlation - Bias

Item	Bias of Incorrect Answer[a]	Correlation for Information-Bias Klemmack (1978)[b]	Correlation for Bias - H. S. Students[c] Pretest[d]	Posttest[e]
1	-	-.19*	.22**	.26**
2	+	-.25*	.14	.12
3	-	-.06	.39**	.47**
4	+	-.08	.24**	.16**
5	-	.05	.33**	.42**
6	+	.15*	.11	.08
7	-	.07	.12	.29**
8	-	-.11	.19**	.35**
9	-	.13*	.19**	.41**
10	-	-.07	.34**	.27**
11	-	.01	.38**	.49**
12	+	-.09	.59**	.18**
13	-	-.07	.52**	.28**
14	+	-.15*	.50**	.20**
15	(-)	.08	.57**	.44**
16	-	-.06	.40**	.36**
17	-	.07	.61**	.49**
18	-	.02	.50**	.27**
19	0	-.03	-----	-----
20	0	-.24	-----	-----
21	-	.08	.57**	.27**
22	-	.14*	.51**	.31**
23	0	.07	-----	-----
24	-	-.09	.34**	.25**
25	-	-.02	.52**	.18**

a Bias of incorrect answers (Palmore, 1977).

b Coefficient statistically significant at the 0.05 level with a two-tailed test.

c R, Multiple correlation coefficient (one-tailed test) where:
Pretest R (N=154) $\geq$ 0.1586 to be significant at 0.025 level.
Posttest R (N=190) $\geq$ 0.1422 to be significant at 0.025 level.

d Pretest internal correlation Alpha = 0.72

e Posttest internal correlation Alpha = 0.56

Mode 13.50 indicating a normal population. Thus the use of parametric statistics was acceptable. This adjusted mean however much closer to the posttest mean. Yet it was significant: t=3.9539 and the $P(|t| \geq 3.95) < 0.001$.

Pro and Antibias Error of the pretest and posttest showed almost identical net negative scores (Table 30). This was significantly above the Bias scores of the individuals in Palmore's (1977) study. But what was most important was the fact that both the positive and negative biases decreased by 8.2% and 7.94% respectively, indicating a change to a more objective view of aging and the aged.

The alpha score for the pretest was 0.7230 indicating a very high internal consistency within the test when testing for bias. The posttest alpha score was a bit lower 0.5582, but a high level of consistency within the test. Considering the Palmore's (1977) Pro and Anti Aged Bias Scores for this study (Table 31), this decrease of internal consistency, which is also reflected in the multiple correlation coefficients (Table 32), seems to reflect a change away from a biased view of the aged and the aging process. It is however also affected by cognitive factors so that the changes may be purely attitudinal or a result the influence of new knowledge. In either case, the precise effects of cognitive vs affective factors on bias could not be esta-

blished from available data.

Item to total score correlation considering all possible split test results (R, the multiple correlation coefficient) was significantly higher than any of the correlations in Klemmack's (1978) study (Table 32). Only items 2, 6, and 7 on the pretest and 2 and 6 on the posttest had no significant item to total correlation in this study. Both 2 and 6 were positively biased items. When considering items thought to exhibit the most bias (Tables 1 and 32) 1, 5, 9, 11, 12, 13, and 15 all were significantly correlated to the total score on the pretest, especially items 12, 13 and 15. Results on the posttest were similar except that the correlations decreased significantly for items 12, 13, and 14, while it increased for items 3, 5, 9, and 11. It was noted (Table 30) that these changes in correlations are associated with increases in the percentages of correct answers, but there is not a simple direct relationship. Item 17, stating that the majority of old people are socially isolated and lonely showed the greatest correlation on both pretest and posttest R = 0.61 and R = 0.49 respectively. The percentage of students with this item correct increased from 38% on the pretest to 47% on the posttest, indicating a trend away negative bias.

Discussion

The comparison of the percent correct for each item indicates greater similarities among those not receiving a significant amount of training than noted when compared to Human Development graduate students and faculty. Thus differences with education do exist due to both cognitive factors and attitudinal factors.

The scores of the high school students while low on the pretest improved to within the level of medical support personnel. This improvement occurred within a two week period. The means of the Medical and Dental students although significantly greater than the high school student scores, indicated that they only scored 70% correct on the test as calculated from Table 27. The differences between this score and those of the graduate students and faculty in the Human Development Department at Duke University (Palmore, 1977), and the success of this high school unit indicate not only a need to educate the general public and the likelihood that such programs can be successful, but a critical need of educating all levels of medical personnel who serve the public. Since even high school students with less life experience and in many cases less cognitive abilities were successful in learning about the aging process and developing more objective attitudes about aging and the

aged, it seems that future doctors, nurses, and dentists who usually must deal intimately with the health problems of aging could benefit themselves and those whom they treat by participating in well organized Aging Education programs.

In regards to the test itself, the ranking of the questions according to the percent incorrect on the pretest and posttest (Table 29) compares with Holtzman and Beck's (1979) ranking individuals in medical and related occupations, thus supporting Holtzman and Beck's theory that ". . . similar myths prevail among different occupational groups". But are not merely cognitive! They have a bias component which Holtzman and Beck (1979) did not seem to consider. They supported the idea that the Palmore Quiz was a valid instrument to measure knowledge which was disputed by Klemmack (1978) but concluded that the test was a poor instrument with which to measure bias. Palmore (1978) argued that although bias and previous experiences do affect ones answers on some test questions it does not negate the amount of knowledge indicated by test scores from a "edumetric" view. Although Palmore does admit (1978) that this quiz could be improved from a "psychometric" view, this quiz still seems to be a valuable though indirect measure of bias, especially when neutral items are removed when bias measurements are considered.

In this analysis of the Palmore Facts of Aging Quiz, it seems to be evident that this is an effective though indirect affective measurement. By correcting for positive bias by using a reversion code and eliminating neutral items from consideration, many of the difficulties encountered by other researchers were eliminated. The high internal consistency within the test (alpha = 0.7230 on the pretest) as well as the highly significant item to total correlations (Table 32) indicate the validity of the test. Many (15 out of 22 or 68%) of the R values were more than double the significant value for R. When the posttest was compared to the pretest many values were lower, although still significant, for example the alpha was reduced to 0.5582 and only 9 out of 22 or 40% of the R values were twice the significance level, although the R value became significant for item 7. Thus the bias and item to total as well as internal consistency appears to be less. A reduction in bias was also indicated by Palmore's Pro and Anti Aged Measurements. But the reduction internal consistency, alpha, seems to indicate a contamination by non-affective, probably cognitive factors.

Thus the Palmore Facts on Aging Quiz appears to be a very important measurement tool for bias. But, it seems also to be most valid for naive groups since any cognitive

factors which may influence individuals in a study program would be difficult to determine. Also if testing for bias the neutral items 19, 20, and 23 should be eliminated from consideration, but of course should be included if overall knowledge is being tested. In conclusion, the Palmore Facts on Aging Quiz is an important, reliable indirect affective measurement, but is best used to compare naive populations because of cognitive contamination during training.

General Discussion

It must thus be concluded that the Aging Education Unit was successful in a public school setting. Students of differring abilities were able to make significant gains, although the degree of their success varied. The mode of instruction was a significant factor in the effectiveness of the program, since even students scoring significantly higher scores on the pretest experienced a low success rate for the unit. Lack of direction and focus, and less self-motivation seemed to be inhibitory factors during the time this unit was scheduled, when there were so many other distractions due to the Holiday Season for all students. These were of greatest significance for the Independent Study Group, but the Holiday Season may have affected all scores as indicated by the lower posttest

scores of the Control Group. The students in the teacher-oriented and Older role-model group seemed to be approximately equal, although the lower pretest scores of the former group which were due to a significantly large number of blank answers may seem to raise the effectiveness of the teacher-oriented group to a small degree especially on the affective test. Also considering the large number of individuals with low cognitive abilities in Treatment Group 3 (Older role-model), it was especially significant that they were successful in their study experiences on the aged and the aging process.

Only Treatment and Race had significant effects on the cognitive results, while all variables but Grade had a significant affective result. Also it can be concluded that elimination of the answers from questions 19, 20, and 23 as discussed in the detailed analysis of the Affective Test, would have provided affective test results that were more free from cognitive effects. Due to the difference in abilities, it is believed that cognitive factors were a major source of variation for Racial effects on the test results. Further testing considering individual cognitive abilities and cognitive styles are needed to clarify the relationships involved. One suggested test model would be an analysis of test scores of students receiving the same Treatment and us-

ing the same materials but who are "tracked" into homogeneous groups by ability and then compare the groups for Treatment effectiveness.

When the variables were analyzed with Treatment as a main effect, Treatment remained a significant variable in all cases emphasizing that the methods which provide the most direction and focus, Treatment Groups 2 and 3, were the most effective. On the cognitive posttest Quarter and Grade became significant but were just below significance when analyzed alone, without Treatment as a co-main effect, (Table 10), thus indicating only a small change occurred which may have been due to the fact that these variables were missing or partially missing from the Control Group, or for cognitive differences when the subgroups of each variable group was subdivided by Treatment groups, as well as some differing effects of the different Treatments on the students within the subgroups. On the Cognitive Posttest, the effect of Sex was still too small to be significant. On the Affective Posttest all variables became significant, even Grade.

No 2-way interactions were detected for Treatment by Race, or Treatment by Sex on either test. A Treatment by Quarter 2-way interaction was significant on both tests, as well as a Treatment by Grade interaction on the Affective

Posttest. The absence of Quarter 1 and Grade 9 from the control group are believed to be factors in this result. However, after reviewing pretest and posttest means of all possible subgroups in this study the small size of some groups allows for less random variation to occur and accordingly some subgroups appeared to be affected by cognitive differences. Also it is suggested that in the case of Quarter differences, after a review of materials, and introducing new classifications or relationships for previously studied topics, those students with some earlier experience and understanding of the terms and concepts are at an advantage even if they could not recall the learned information on the pretest, because they lacked the "right cues".

As consequence, of the last suggestion, there is a very strong implication that Aging Education Units should be correlated with other materials a student studies throughout his or her school years. Perhaps only a 12 week study of related materials was not enough of a variable difference to produce significant effects alone. Likewise the Grade difference was probably not significant enough to create significant effects by itself. However, the fact that the effects of Grade were noted on the Affective Posttest corresponds to Storck and Cutler's (1979) analysis of attitudes for the same student body, in which Age was a weekly significant

variable.

Analysis of the Palmore's Facts on Aging Quiz (1977) indicates very high alpha scores and high multiple correlation coefficients and thus high levels of internal consistency and item to item to total correlation, after the neutral items were removed from consideration. These correlations were most significant on the pretest. Accepting the fact that some cognitive factors are still present, it seems that the Palmore test is a quick, valid indirect measure of bias. It is suggested that when used simply as an affective test, the neutral item answers should be removed from consideration in future studies in order to obtain more accurate results. Comparisons with modifications of this test, using multiple choice questions for example, might also be used in a repeat of Mode of Instruction study for the sake of comparison. In addition, delayed testing is suggested to determine the long term effectiveness os this similar Aging Education Programs.

Thus this study poses new questions, especially as to what cognitive factors influence the results of an Aging Education Unit. But, it also indicates that directed Modes of Instruction whether Teacher-Oriented or Older role model-oriented are imperative for the maximum results on an Aging Education Unit where public school classes are heterogeneously grouped.

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VITA

Janice Marie Lalor was born in Boston, Massachusetts, on May 15, 1946, the daughter of Theresa Elizabeth Moody Lalor and Edward Thomas Lalor, Sr. After graduating from Notre Dame of Bridgeport High School, Bridgeport, Connecticut, in 1964, she attended Albertus Magnus College, New Haven, Connecticut during 1964-68 and earned the Bachelor of Arts Degree in Biology. During the summer of 1966 she also attend Fairfield University, Fairfield, Connecticut. During 1968-69 she was employed as a life science teacher at Saxe Junior High School in New Canaan, Connecticut. Following that, during 1969-1970, she was employed as a biology and applied science teacher at Ridgefield High School, Ridgefield, Connecticut and later in 1970 as a substitute teacher in both the Stamford, Connecticut Public Schools and the Greenwich, Connecticut Public Schools. During 1969-1970 she matriculated as a graduate student in science education at Fairfield University. In 1970, she transferred to Texas Christian University, Fort Worth, Texas. During her graduate studies at Texas Christian University she became a member of Phi Sigma, the National Biology Honor Society, and in 1972 earned the Master of Arts in Teaching Degree in Biology. She has been employed, since 1972, by the Dallas Independent School

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